

# The Catheter

## How to Use and When Not to Use

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■ *Catheterization should not be used without true indication. Careful control of hydration, sedation, anesthesia and use of anticholinergic agents before, during and after operation can do a great deal to prevent the need for catheterization. When the procedure is necessary, simple, inexpensive measures of care usually are sufficient. Prophylactic antisepsis before and after, with reexamination of the urine after discontinuance of antiseptic drugs to make sure there is no recrudescence, prevents acute and chronic infections.*

*The catheter recommended for routine male and female catheterization is the 14-16 (French) olive tip coude (Tieman) catheter or the Tieman-Foley.*

*Closed drainage systems are the best. Continuous irrigation is without value. Water is an excellent irrigant. Calcium deposits are prevented by Renacidin® instillation and acetic acid irrigation.*

MUCH HAS BEEN SAID and written about morbidity and possible lethal sequelae of urethral catheterization, and while it is true that problems can arise incidental to urethral instrumentation, for the patient who cannot void urine spontaneously, the benefits far outweigh the faults.

As physicians, we must do all we can to prevent the conditions necessitating catheterization; but since the procedure is sometimes necessary we should teach ourselves and assistants the indica-

tions and contraindications, the proper types of catheters and the techniques of using them. Prophylaxis against infection before, during and after catheterization must be emphasized.

Lest they be passed over in the recent welter of reports by internists, bacteriologists and urologists emphasizing new and costly methods of catheter care, good inexpensive ways to serve those purposes are described in this communication.

### Indication

The prime indications for vesical catheterization are: (1) to empty a full bladder with complete retention; (2) to withdraw urine from a partially

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full bladder, with or without infection, for diagnosis or cytography, for relief of lower obstructive uremia or for alleviation of symptoms; (3) to ascertain the presence or absence of infection after bacilluria or pyuria is noted in a voided specimen; (4) to dilate urethral strictures; (5) to drain the bladder after operation on or around the bladder or prostate; (6) to drain the bladder and splint the urethra after surgical treatment of the urethra; (7) to retain ureteral catheters exiting from the urethra; (8) to collect data for research purposes; (9) to determine whether true oliguria is present and to monitor output; (10) to be prepared for retention, as after abdomino-perineal rectal resection.

### Contraindication

Vesical catheterization should not be done (1) to determine the presence of infection until after voided urine collected by the two-glass or three-glass technique has been examined; (2) in the presence of acute prostatitis, unless there is complete urinary retention; (3) on routine order for catheterization *pro rata necessitatis*, except where there is true indication for the procedure.

### Preventing the Need for Catheterization

In most situations, proper collection, prompt delivery to the laboratory and immediate examination of spontaneously voided urine obviates the need to obtain specimens by catheterization for accurate bacteriologic study. However, regardless of how obtained, prompt examination is mandatory, in light of the fact that bacteria in the specimens double in number every 20 minutes.

Anticholinergic agents, including antihistamines and atropine-like drugs, decrease the power of the vesical detrusor. Sympathomimetic drugs may place the detrusor at a disadvantage. This sometimes occurs without preexisting obstruction, and it is common where organic block is present. Therefore, use of these drugs should be avoided or held to a minimum in patients with urethral obstruction, especially surgical patients.

Whatever the operation, the patient should void before receiving preoperative medication and before going to the surgical suite. The anesthetist should use only enough intravenous fluid to keep the needle open and to replace calculated fluid loss. Anesthesia should be gauged so that it will not continue long after operation, for it is impor-

tant that the patient become aware of the filling bladder and initiate urination as early as possible lest long retention cause decompensation of the detrusor. For this reason spinal anesthesia should be avoided if possible. With general anesthesia relaxation is obtained as needed by use of curare-like drugs with or without tracheal intubation. Also to prevent long retention, postoperative sedation should be held to the serviceable minimum. The patient must be able to get up and stand or to sit on a commode to urinate during the first 12 hours.

Orders for routine catheterization should not be given. It must be borne in mind that if a patient does not urinate the reason may be no more sinister than simply that he has so little urine in the bladder, he has no need to void. Lest severe retention be suspected in such cases, interns, nurses and nurses' aides should be carefully instructed in suprapubic percussion to determine whether the bladder is full. If the patient is awake and alert, questioning him can be helpful. When there is no dullness on percussion and the patient says he has no desire to urinate, catheterization is not needed.

Simple, traditional methods can be used to promote spontaneous urination. External warm douches or hot sitz baths will help.

The use of cholinergics is theoretically sound, but one ought not wait long for success after such drugs are given. The decompensated detrusor does not respond in physiologic manner, but drugs may be helpful in restoring function to the vesical detrusor.

### Types of Catheters

There are several varieties of catheters that can be recommended. These are: the 14 or 16 (French) olive tipped coude (Tieman) plain or Foley catheter with a 5 ml bag; the olive tipped or regular 14 to 20 (French) with 30 ml bag; the regular Foley 14 to 18 (French) with 5 ml bag; the short tipped Foley 18 to 24 (French) regular with 5 ml bag; the 8, 10, 12, 14 (French) plain or Foley coude (Tieman) or regular Foley for infants and children. (See Figure 1.)

The best catheters for intermittent or indwelling use both in men and women are the olive tipped coude (Tieman) variety. They are shaped for the male urethra, but they easily enter through most obstructions and the sphincter in both sexes. They are firm enough to permit accurate direction of a considerable length of tubing. If a technician has difficulty in passing a No. 14 coude olive tipped

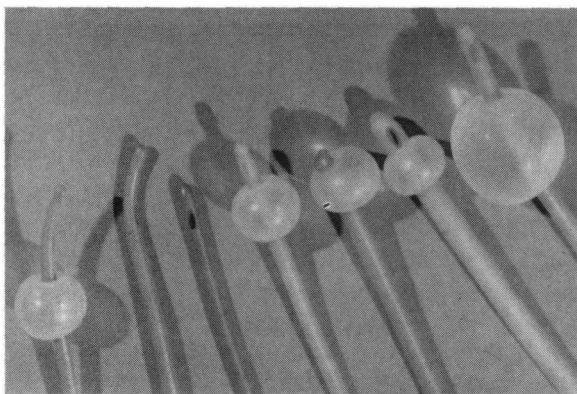


Figure 1.—Ideal catheters. Left to right, olive tipped coude types (which are best), whistle tipped plain, standard Foley, two short tipped Foleys and 30 ml bag Foley.



Figure 2.—Technique of injection of water-soluble lubrication or local anesthetic into urethra.

(Tieman) catheter, he should abandon the effort and call a physician.

Catheters with 30 ml bags are used for unruly patients. To prevent their forcibly extracting the tube, and possibly injuring the urethra in doing so, the bag should be inflated to 40 or 50 ml.

After initial catheterization with coude types, subsequent catheter replacement is easy. The No. 16 to No. 18 (French) regular catheter may be placed in males or females for long-term use.

Special types of catheters, bougies, guides and surgical catheters, are not presented here, but it should be noted that if they are needed a urologist should be called in. The same applies to the suprapubic catheter. The short tipped regular Foley 18 to 24 (French) is better if suprapubic catheters have to be changed by technicians. Catheters of the types used in various situations for adults can be used for children also, except that the smaller sizes are not made in the coude manner.

### Technique of Catheterization

Asepsis is a necessary part of catheterization procedure. Soap and water is adequate for cleansing of the penis or vulvae. Simple antiseptic solutions should be applied about the meatus with cotton or gauze swabs. Eye sheets are best for draping the area but a single towel can be made to serve. Sterile gloves should be worn. Unless the table-side tray is so designed that instruments can be selected quickly, an assistant is needed. Sometimes in the catheterization of women an assistant must retract the labia to insure continuous view of the urethral opening.

Local anesthesia, although not necessary, may be helpful if the patient is apprehensive. For men

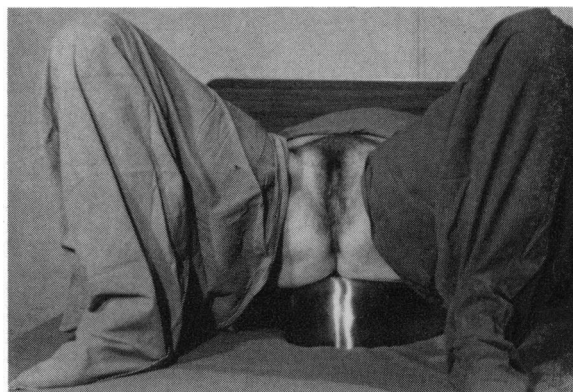


Figure 3.—For female patients, putting reversed bed pan under buttocks directs perineum anteriorly and makes urethra easily accessible.

a lidocaine (Xylocaine®) jelly introduced into the urethra is best for this purpose. Aqueous cocaine, 5 percent, applied to the urethral meatus is recommended for women, although lidocaine does fairly well and does not entail the hazard some observers attribute to cocaine. Cocaine should never be used for men because of the possibility of dangerous absorption along the relatively long urethra.

In male catheterization, lubrication is the most important single item. For this a Luer syringe, without the lock, is filled with water-soluble jelly and the tip is introduced into the meatus. About 10 ml of jelly is injected into the urethra (Figure 2). The coude (Tieman) catheter then will pass easily in almost all patients. If it does not, a urologist is needed. For females the catheter tip is generously smeared with a lubricant before it is inserted.

After placement of the catheter a bladder syringe (preferably with a 2-ounce rubber bulb) is used to

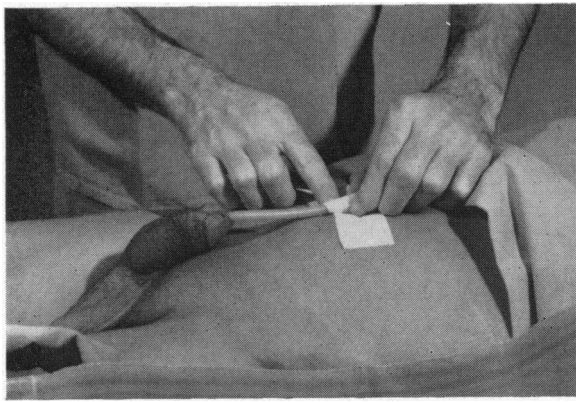


Figure 4.—If tape must be used, tape catheter cephalad and over thigh.

aspirate the tract to keep the lubricating jelly from blocking the catheter.

The position of the patient is more important in females than males. For males, the supine position in bed is adequate. In some females, even with abduction of thighs and flexion of the knees, the urethral opening may be difficult to see. In that case putting a bedpan upside down under the buttocks will turn the perineum upward (Figure 3). Even then, an assistant may be needed to spread the labia to enable direct visual access to the urethra without contamination. Good lighting is necessary.

In all cases without exception, regardless of the reason for catheterization, the amount of urine obtained at each voiding must be measured and recorded. If there is any doubt about the presence of infection, some of the urine should be collected in a sterile bottle for laboratory study.

The Foley balloon is inflated with 7 or 8 ml of water. Air should never be used, for it can escape unseen. If only 5 ml of water is injected, the bag is not adequately inflated and in females it may pull out of the bladder while in males it may pull out but lodge in the urethra at the point of passage through the prostate, causing pain and failure to drain. The arm of the balloon conduit should be folded back and secured with a rubber band and tape to prevent leakage at the valve.

The catheter should be connected to closed drainage collection devices. If it is to be secured in place by tape, women should have the tubing laid over the thigh so they can see it and protect it, and for men the penis should be turned cephalad to avoid abscess formation at the peno-scrotal angle (Figure 4).

## Suprapubic Catheterization

Suprapubic catheterization, which is to be done only by persons trained in the procedure, should be reserved for use mainly when urethral intubation cannot be accomplished or when there is need for special bacteriologic information under research conditions. The instruments available are the standard spinal needles, small trochar needles and the suprapubic punches that are so designed as to permit placement of a catheter. The technique requires that the bladder be full, as determined by percussion. Local anesthesia is sufficient.

## Prophylaxis

If preventive measures to forestall catheterization fail and the procedure becomes necessary, prophylaxis against possible infection is advisable. Culture and sensitivity tests, theoretically indicated to determine what drug to use take time and cost money. In lieu of such determinations a polyvalent oral antiseptic agent, either chemical or antibiotic, can be used. Subsequent choice of agents to prevent pyelonephritis and decrease the bacterial count in the bladder can be made empirically. In long-term catheterization, antiseptic agents help prevent deposits of calcium on the catheter. Other prophylactic measures when vesical drainage must be continued for a long time include low calcium intake, acidification, dilution of the urine, and frequent change of position by the patient.

## Care During and After Catheterization

Rules for care of catheterized patients vary according to sex, the duration of intubation and whether the catheter is placed urethrally or suprapubically.

In both sexes, the drainage tube should lie across the thigh to insure protection and accessibility. Taping to hold it in place usually is not necessary, but if circumstances make fixation advisable the catheter must be cephalad in males to protect the peno-scrotal junction from pressure (Figure 4).

Urethritis is common with use of an indwelling catheter in males, and care must be taken to prevent damage from this complication. The meatus and the catheter must be cleansed several times daily to prevent crusting and obstruction. Application of various ointments about the meatus may be helpful. Hot sitz baths or hot wet packs once or twice daily help to prevent or to clear urethritis.

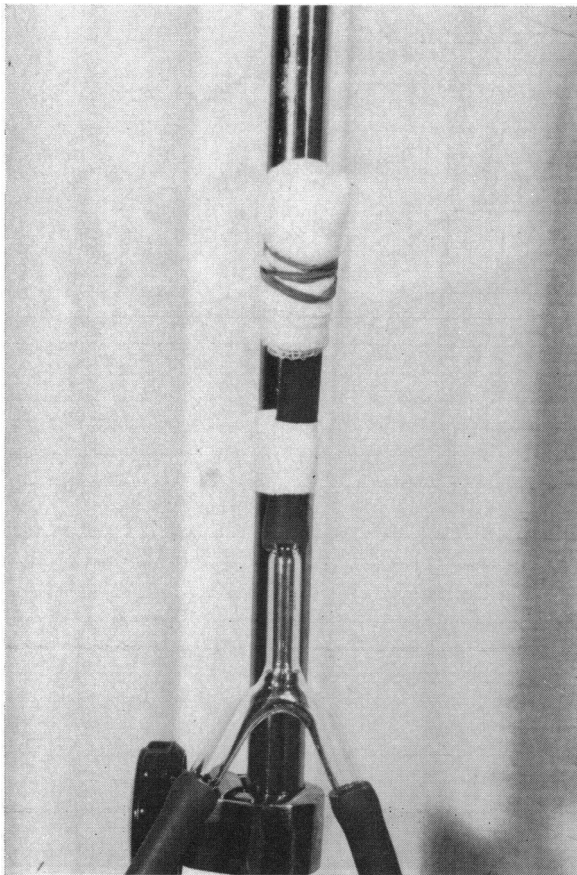


Figure 5.—Open Y breaks siphon. Elevation above bladder allows partial filling and relieves bladder spasm.

A good pack can be made of two bath towels, immersed in hot water and wrung out. After wax paper has been placed under the buttocks to protect bedclothing, the towels are wrapped around the genitalia and catheter (with penis pointing cephalad). With a hot water bottle placed on the towels and an old bath blanket covering all, the pack will stay warm for 30 to 40 minutes.

In females, external and internal warm douching with plain water prevents or relieves labial and urethral irritation and lessens the likelihood of ascent of infection through the urethra.

The fistula of the suprapubic catheter must be cleansed daily with soap and water. Application of silver nitrate prevents exuberant granulation about the fistula. A small surgical gauze pad should be placed around the tube at the point of entry and changed daily.

For bladder pain and bladder spasm, which may occur during the first day or two, rectal suppositories containing 50.0 mg of opium and 15.0 mg of belladonna provide relief. Intermittent drainage

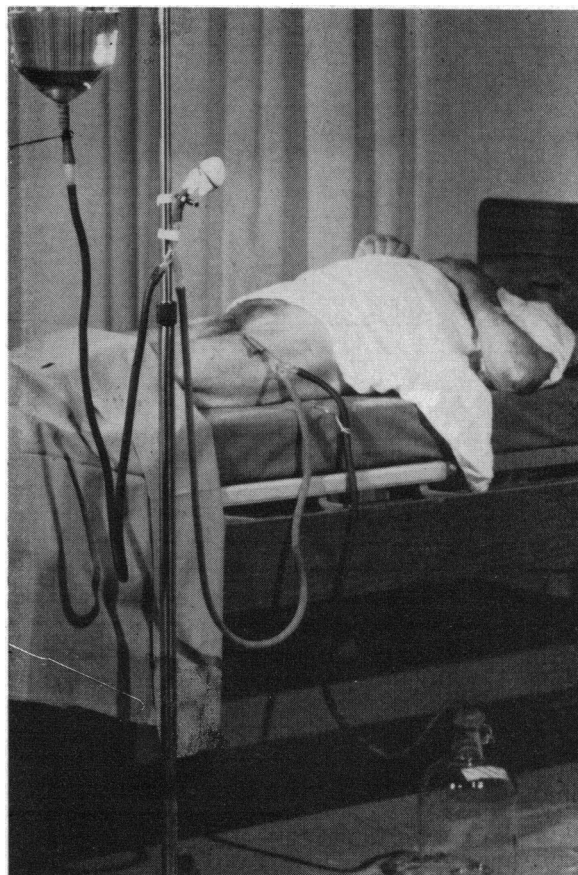


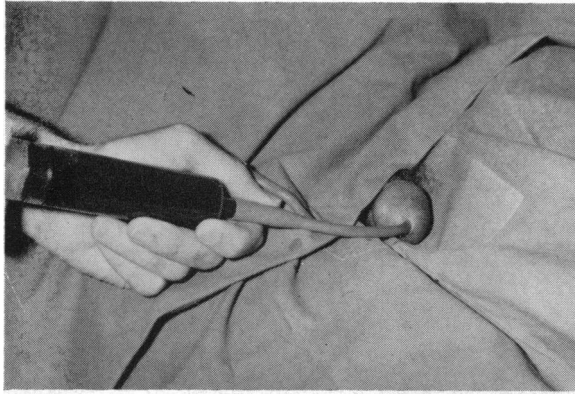
Figure 6.—Intermittent bladder irrigator. Commercial disposable equipment is available.

may be necessary for relief of pain. Interposing a Y glass in the drainage system permits breaking of the siphon from time to time as necessary; and if the Y is elevated well above the bladder, partial distension is maintained, which prevents spasms (Figure 5). Use of a chemical dye so that the patient can "see what goes on" may have some psychological effect.

For continuous drainage, equipment should be of the closed variety. Three-way catheters with continuous irrigation-drainage devices are ineffective. For proper irrigation when three-way catheters are used, the outflow must be alternately clamped and released three times every hour to distend the bladder.

One-way intermittent irrigation equipment, without the continuous inflow, works very well. This is used mainly after operations on the bladder or prostate. The outflow of the Y is clamped and inflow released to allow the bladder to distend enough to hold 100 to 150 ml. Then the bladder is allowed to drain and the procedure is repeated





**Figure 7.**—Two-ounce glass plunger syringe. Inject and aspirate vigorously to evacuate clots.

two or three times (Figure 6). If there is active bleeding, irrigation must be done frequently. Should clots form, brisk in-and-out irrigation with a 2-ounce glass plunger syringe must be carried on until all clots are evacuated (Figure 7).

For ambulatory patients, in or out of the hospital, intermittent drainage or constant drainage into a leg bag is used. A device for intermittent drainage can be provided simply by doubling the outside tip of the catheter on itself, placing a clothespin to maintain the kink and fastening the clothespin to the underwear with safety-pins to prevent sitting on the tube (Figure 8). By opening the jaws of the clothespin and straightening the kink, urine can be released as necessary.

A patient with a catheter arranged for intermittent drainage must be cautioned never to sit in a bathtub or sitz bath with the catheter open and never to permit the end of the catheter to dangle into the toilet bowl.

Simple water is the cheapest liquid for irrigation, and a very effective one. Saline solution or distilled water costs more without much known additional benefit. Adding an antiseptic agent to the solution may help. As the aim of irrigation is to cleanse, distension of the bladder with four-ounces of fluid several times at each irrigation is good practice to provide the positive aspiration necessary for extracting debris from the bladder. The best instrument is a 2-ounce rubber bulb syringe with a strong bulb. If clots are present a 2-ounce glass plunger syringe should be used, with forced injection and strong withdrawal applied alternately until they are cleared. It must be borne in mind, however, that in some situations, such as following repair of vesicovaginal fistula, irrigation must not be too aggressive.



**Figure 8.**—Clothespin clamping catheter, permitting ambulation.

Patients requiring long-term catheter drainage must be observed for calcium deposits and vesical calculi. The catheter should be changed the first time after it has been in place one to two weeks. If no lime is present, the catheter may then remain in place for three to four weeks and the interval can be gradually increased, although never to longer than three months.

If lime deposits form, one ounce of Renacidin® (10 percent anhydrous citric acid, D-gluconic acid [as lactone]) is instilled into the bladder and held there for 30 minutes twice daily. The bladder then is thoroughly irrigated with a 1/16 to 1/64 solution of acetic acid in water to prevent subsequent calcium deposits on the catheter.

In most cases antiseptics are not necessary but if clinical manifestations or smear or culture examination indicates infection, chemical or antibiotic agents may be used to prevent the organisms from ascending to the kidneys.

A complication that sometimes occurs is that the catheter balloon will not deflate. Usually the cause

is that inadvertently a clamp has been placed across the balloon intake. Large balloons cannot simply be distended with water to the bursting point for there is not enough room to spare in the bladder. To remove the catheter in such circumstances, first instill one ounce of sterile oil and fill the bladder with water. Then injection of 5 ml of medical chloroform ether or acetone through the valve will cause the balloon to burst. The bladder then should be irrigated thoroughly and more oil instilled. The patient should be warned beforehand that a period of burning, pain, frequency and urgency of urination will follow. The extracted catheter must be inspected to make sure that all of the balloon is present. If not, whatever remains must be removed cystoscopically.

With 5 ml balloon catheters, injection of water until the bag bursts is proper. Pieces of rubber are more likely to be left behind with this method and at times cystoscopy is required. Catheter balloons will not burst on application of electrical current with an electrode. They must be punctured mechanically. If a urologist is not available, the bag can be deflated by first distending it with air, then aspirating through a suprapubic needle.

Occasionally catheters will have such great deposits of calcium that removal after balloon deflation seems impossible. Firm traction should be applied in such cases and the tube will come out, but pain and bleeding will result. The alternatives are cystoscopy or attempts at dissolving the calcium, if time permits.

## Post-Catheter Care

After simple catheterization antiseptic agents should be given by mouth for five days to prevent infection. Usually indwelling catheters are in place for two to seven days or longer, and antiseptics should be given during that time as well as afterward.

After removal of the catheter the patient's ability to urinate must be ascertained. All the urine voided at each urination should be collected in separate bottles and the volume, time and color observed and recorded. For females, urine should be collected in a bed pan or commode and measured.

The patient must be questioned as to urgency, control, dysuria, size and force of the stream, ease or difficulty of urination and whether he feels relieved. If there is doubt, percussion of the suprapubic area will differentiate between the fullness of the bladder and symptoms referable to an irritable detrusor.

Effective antiseptic agents should be continued until the urine is free of pus and bacteria on methylene blue smear and it should be examined again two and six weeks after cessation of antiseptic treatment. If recrudescence occurs, the urine should be cultured and a suitable antiseptic agent given in the same sequence as was followed the first time. If relapse occurs again, urologic study is indicated. Careful attention to these details will prevent chronic infection. Cultures and disc sensitivity studies cannot be relied upon, as they are notoriously inaccurate.

## CANCER FELLOWSHIPS

Postgraduate Fellowships in cancer for practicing physicians are available at the University of Southern California School of Medicine and the Los Angeles County-University of Southern California Medical Center. These Fellowships are sponsored by the National Cancer Institute, are of one month's duration and carry a stipend of \$750. Separate programs are available in tumor surgery, tumor pathology, radiation therapy, and medical oncology. Applicants should be Board eligible or Board certified and should submit a resumé of their professional background to Arthur J. Donovan, M.D., Program Director, Cancer Training Program, School of Medicine, University of Southern California, 2011 Zonal Avenue, Los Angeles, Ca. 90033.